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CIRCULAR No. 122
(OCTOBER, 1914)

THE MANAGEMENT OF STRAWBERRY SOILS IN THE PAJARO VALLEY AND ITS PROBLEMS

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INTRODUCTION

The methods now in vogue for the management of strawberry soils in the Pajaro Valley have, it is believed, resulted in certain reductions in their productive capacity due apparently to unknown causes. Such decreases in productive capacity, which have caused much uneasiness among strawberry growers there, become manifest, it is claimed, more particularly in the second planting on the same piece of land. In other words, the opinion is current that it does not pay to plant strawberries twice in succession on the same piece of land. In order to obtain some idea with reference to the status of this problem, the writer visited several of the prominent growers of the district in question and together with them went over their plantings in order to make the necessary observations and field studies. It was hoped that such visits together with certain physical and chemical examinations which were made on soil samples from representative strawberry patches might throw some light on the real nature of the difficulties. At least they should allow of the formulation of an unbiassed statement with reference to the whole matter which can serve as a guide to the strawberry grower. With this end in view the writer presents the brief subjoined statement based on a preliminary study of the situation under consideration and hopes that, pending such time as the problem may be more definitely solved, his recommendations may prove of value to the strawberry industry of the Pajaro Valley.

THE PHYSICAL AND CHEMICAL CONDITION OF THE SOIL

The physical nature of the soils used in strawberry growing in the Pajaro Valley varies from clay loam to stiff clay. The soils are all very rich in organic matter, and when planting is begun their

physical condition is splendid. Most of the soils are deep. When, however, they are planted in strawberries the physical condition may be seriously injured by certain methods of handling, more fully discussed below. The soils hold water very tenaciously.

The chemical condition of the soils in question is excellent. We have made analyses of soils from both the Reiter and Burland ranches for both the total and the available plant food supply and have found them very rich in all respects, as was to be expected from their origin and position. They are, indeed, among the richest soils of which we have knowledge from the point of view of both the total and the available nitrogen, phosphoric acid, potash, and lime supply. Moreover, in making analyses of soils cropped for three and four years, and new land just being planted to strawberries for the first time, we could find no lack of total and available plant food in any of the soils. The heavy production for three years does not seem to have seriously affected the supply of plant food in the soil. No alkali was found in several of the soils examined and it is indeed rare to find seriously large quantities of soluble salts in any of the strawberry soils of the Pajaro Valley.

INTERVIEWS WITH GROWERS AND THEIR RESULTS

Seven of the leading growers of strawberries in the Pajaro Valley were interviewed by the writer in their respective fields and the following points brought to light as a result:

1. All but one or two of the growers felt more or less strongly that a soil is injured for the same plant if one crop of strawberries has been grown on it for three to five years.

2. Very little indisputable evidence of such a condition is available.

3. More than half of the growers interviewed could not of their own knowledge point to a patch of berries which was the second in succession on the same piece of land that was giving evidence of marked decreases in yields (as compared with the first crop).

4. Of the balance of the growers only two could definitely point to strawberry patches in which one planting had immediately followed another. In these cases it was stated that the second planting did not yield nearly as well as the first. However, owing to a change in the variety of strawberry from one planting to another, or to marked changes in the methods of management, one could not be sure whether the second planting was being injured by factors bequeathed to it by the first crop or was suffering by comparison as a result of the changes mentioned.

All the statements, therefore, which were made to me by growers, taken together with my own observations, when boiled down and crystallized, yield the following conclusions:

1. Some deterioration for the same crop does occur in the yielding power of land after one crop of strawberries has been grown on the land.

2. The cause for this is unknown.

3. The condition cannot, in the light of present knowledge, justifiably be claimed to be the result of a direct injurious effect of the strawberry plant on the soil.

METHODS OF SOIL MANAGEMENT NOW IN VOGUE

The berries are planted on ridges about 18 inches wide, with two rows on each ridge. The uncropped space between the ridges is therefore a natural depression which is used as an irrigation ditch. Water is run into these ditches twice, thrice or even more times a week, every time until the ditch is full throughout its entire length, the water standing only an inch or less below the surface of the ridges. As the water slowly disappears either through percolation or evaporation the ditch bottom is allowed to become dry and hard under the influence of the sun. Owing to its large clay content shrinkage follows such drying and baking and the whole surface of the soil becomes badly checked. No cultivation in the ditch spaces between the ridges is practiced. The berry pickers aggravate the packed condition of the soil between the ridges by walking over and squatting on it as they work. Aside from the thorough preparation through tillage of the soil at the time of planting, no other treatment, save irrigation, is given the soil, except in some instances in which, in recent years, fertilizers have been applied, apparently erratically, to the soil on the ridges.

Apple trees are usually set out at the time when a new strawberry patch is started, especially when land is leased. This insures to the owner of the land a young apple orchard about ready to bear at the expiration of the four or five years' lease of the strawberry grower. It may be said in passing that most of the apple orchards of the Pajaro Valley originated in this way. Owing to these apple plantings, moreover, it is so difficult to find land there which has been in strawberries more than once and on which reliable information may be obtained with reference to the alleged unsuitability of land bearing strawberries once for another crop of that same plant. The lessees of land naturally complain about even the possibility of such deteri-

oration because their irrigation systems are installed at very considerable cost and the investment would seem to be more than even big crops during three or four years would justify.

THE WEAKNESS OF THE PRESENT METHOD OF MANAGEMENT

The chief weakness of the present method of handling these soils as briefly outlined above is to be found in the fact that it militates against a proper supply of air in the soil. The air is necessary to insure healthy and large root systems, good bacterial action, and the proper chemical reactions for the supply of plant food to the plants. The reason for the poor air supply in the soils in question under the present method of management is twofold. The too frequent irrigation waterlogs the soil and drives out the necessary air. The compaction and non-cultivation of the ditches between the ridges does not leave large enough spaces to hold air and makes it difficult for the latter to penetrate into the soil.

PROPOSED IMPROVEMENT IN METHODS OF SOIL HANDLING

It is obvious from what has been said above that improvement in the method of handling the strawberry soils must be chiefly along the lines of improving the air conditions. The writer suggests therefore the following procedure:

1. Irrigation not oftener than once every two weeks. Less frequent irrigation is desirable.

2. Deep cultivation with one-horse cultivator of the ditch soil. To be carried out as soon as a horse can walk in the space without puddling the soil.

3. Thorough hoeing on the ridges between the plants. This is especially important in the case of new plantings.

In addition to these methods of soil management during the ordinary life of a strawberry patch the following procedure should be followed in cases in which it is desired to follow one crop of strawberries by another. In the late fall of the year in which a patch has "run out," the land should be deeply plowed (preferably 10 to 12 inches in depth), thoroughly harrowed, and sowed to bur clover, Canada field peas or any other legume which will make a heavy winter growth. The earlier this is done in the fall the better. In the spring the cover crop should be deeply plowed under and then the soil properly prepared for planting the new crop.